

CLAIMS

We claim:

1. A composition comprising:
 - (a) an elastomer comprising C₄ to C₇ isoolefin derived units;
 - (b) a processing oil;
 - (c) a material selected from:
 - (i) a hydrocarbon resin grafted with a graft monomer;
 - (ii) oligomers having units selected from the group of cyclopentadiene, substituted cyclopentadiene, C₅ monomers, and/or C₉ monomers, grafted with a graft monomer, or
 - (iii) combinations of (i) and (ii)
2. The composition according to claim 1 wherein the hydrocarbon resin is selected from the group consisting of: aliphatic hydrocarbon resins, hydrogenated aliphatic hydrocarbon resins, aromatic hydrocarbon resins, hydrogenated aromatic resins, aliphatic/aromatic hydrocarbon resins, hydrogenated aliphatic/aromatic hydrocarbon resins, cycloaliphatic hydrocarbon resins, hydrogenated cycloaliphatic resins, cycloaliphatic/aromatic hydrocarbon resins, hydrogenated cycloaliphatic/aromatic hydrocarbon resins, polyterpene resins, terpene-phenol resins, rosin esters and mixtures of two or more thereof.
3. The composition according to claim 1 comprising 2-10 phr grafted material.
4. The composition according to claim 1 comprising 4-8 phr grafted material.
5. The composition according to claim 1 wherein hydrocarbon resin is a thermally polymerized aromatic-containing cyclopentadiene hydrocarbon resin.
6. The composition according to claim 1 wherein the hydrocarbon resin is substantially hydrogenated before grafting.

7. The composition according to claim 1 wherein the oligomers are oligomers comprising cyclopentadiene, substituted cyclopentadiene, and C₉ monomers.
8. The composition according to claim 1 wherein the oligomers are substantially hydrogenated before grafting.
9. The composition according to claim 1 wherein the grafted material has an aromatics content less than 15%.
10. The composition according to claim 1 wherein the processing oil is selected from paraffinic oils, aromatic oils, naphthenic oils, and polybutene processing oils.
11. The composition according to claim 1 comprising 2-20 phr processing oil.
12. The composition according to claim 1 comprising 5-15 phr processing oil.
13. The composition according to claim 1 wherein the graft monomer is maleic anhydride.
14. The composition according to claim 1 further comprising a filler selected from carbon black, modified carbon black, silicates, exfoliated clay, partially exfoliated clay, modified exfoliated clay, modified partially exfoliated clay, and mixtures thereof.
15. The composition according to claim 1 further comprising a secondary rubber selected from natural rubbers, polyisoprene rubber, styrene-butadiene rubber (SBR), polybutadiene rubber, isoprene-butadiene rubber (IBR), styrene-isoprene-butadiene rubber (SIBR), ethylene-propylene rubber, ethylene-propylene-diene rubber (EPDM), polysulfide, nitrile rubber, propylene oxide polymers, poly(isobutylene-*co-p*-methylstyrene), halogenated poly(isobutylene-*co-p*-methylstyrene), poly(isobutylene-*co*-cyclopentadiene), halogenated poly(isobutylene-*co*-cyclopentadiene), poly(isobutylene-*co*-isoprene-*co-p*-methylstyrene), halogenated poly(isobutylene-*co*-

isoprene-co-*p*-methylstyrene), poly(isobutylene-co-isoprene-co-styrene), halogenated poly(isobutylene-co-isoprene-co-styrene), poly(isobutylene-co-isoprene-co- α -methylstyrene) halogenated poly(isobutylene-co-isoprene-co- α -methylstyrene) and mixtures thereof.

16. The composition according to claim 1 wherein the elastomer comprises units selected from isobutylene, isobutene, 2-methyl-1-butene, 3-methyl-1-butene, 2-methyl-2-butene, 1-butene, 2-butene, methyl vinyl ether, indene, vinyltrimethylsilane, hexene, 4-methyl-1-pentene, isoprene, butadiene, 2,3-dimethyl-1,3-butadiene, myrcene, 6,6-dimethyl-fulvene, hexadiene, cyclopentadiene, piperylene, styrene, chlorostyrene, methoxystyrene, indene and indene derivatives, α -methylstyrene, *o*-methylstyrene, *m*-methylstyrene, and *p*-methylstyrene, and *p*-tert-butylstyrene.
17. The composition according to claim 1 wherein the elastomer is a terpolymer.
18. The composition according to claim 1 wherein the elastomer is halogenated.
19. The composition according to claim 1 further comprising a curing agent selected from sulfur, sulfur-based compounds, metal oxides, metal oxide complexes, fatty acids, peroxides, diamines, and mixtures thereof.
20. The composition according to claim 1 or 19 having a green tack above 0.5 N/mm.
21. A cured composition according to claim 19 having a brittleness temperature below -36°C.
22. A cured composition according to claim 19 having an air permeability less than $4.0 \times 10^{-8} \text{ cm}^3 \cdot \text{cm} / \text{cm}^2 \cdot \text{sec} \cdot \text{atm}$.
23. An article selected from tire curing bladders, innerliners, tire innertubes, and air sleeves comprising a composition according to claim 1 or 19.

24. An article selected from tire curing bladders, innerliners, tire innertubes, and air sleeves comprising a grafted hydrocarbon resin, grafted oligomers having units selected from the group of cyclopentadiene, substituted cyclopentadiene, C₅ monomers, and/or C₉ monomers, and/or combinations thereof.
25. A process for manufacturing an air barrier comprising mixing (a) an elastomer comprising C₄ to C₇ isoolefin derived units; (b) a processing oil; (c) a grafted material obtainable by the reaction of an unsaturated acid or anhydride and (i) a hydrocarbon resin, (ii) oligomers having units selected from the group of cyclopentadiene, substituted cyclopentadiene, C₄-C₆ conjugated diolefins, and/or C₈-C₁₀ aromatic olefins, and (iii) combinations of (i) and (ii).
26. The process according to claim 25 further comprising curing the mixed composition.